Center Innovation Fund: KSC CIF

Regenerative Ammonia Recovery from ISS Wastewater to facilitate Plant Growth

Completed Technology Project (2016 - 2017)

Project Introduction

The KSC ammonia removal process repeatedly pumps wastewater through columns of MgHPO4, with ammonia measurements and pH adjustment between columns. Columns will be regenerated when saturated to recycle the MgHPO4. Different concepts for retrieving released ammonia will be tested. The process has the potential to become highly efficient, removing as much as 95% of the ammonia in wastewater. A number of factors such as residence time, column geometry, and pH need to be assessed to optimize system performance. Following optimization, these factors can be linked to develop a continuously operating system that can then be scaled for flight, as well as for other potential industrial and environmental applications.

Anticipated Benefits

Removal and recycling of nitrogen from wastewater is a critical technology for the International Space Station (ISS) and future long-duration exploration missions. Nitrogen as ammonia is valuable for plant growth systems, but finding a way to remove it from the water stream without sodium (a toxin for plants) is difficult. KSC has developed a removal process for ammonia that precipitates struvite, a compound of Magnesium Ammonium Phosphate, all chemicals beneficial to plants. This process could produce nitrogen for plants while preventing sodium accumulation.

Primary U.S. Work Locations and Key Partners

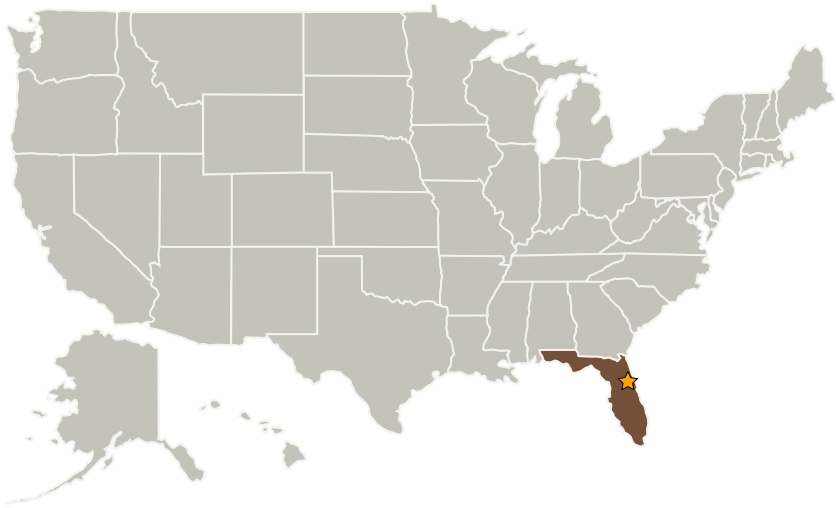

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Table of Contents

Regenerative Ammonia Recovery from ISS Wastewater to facilitate Plant Growth

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Florida International University	Supporting Organization	Academia Hispanic Serving Institutions (HSI)	Miami, Florida
Florida Space Grant Consortium(FSGC)	Supporting Organization	Academia	Orlando, Florida
University of Central Florida(UCF)	Supporting Organization	Academia	Orlando, Florida

Primary U.S. Work Locations
Florida

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Innovation Fund: KSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

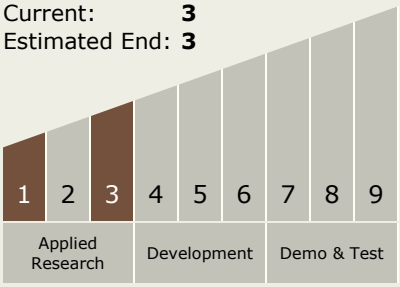
Barbara L Brown

Principal Investigator:

Gioia D Massa

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management

Target Destinations

Earth, Mars, Outside the Solar System